

mind of the student as possible; and this, we think, might best be accomplished by prefixing to each chapter diagrammatic sections of the succession of strata, exhibiting their equivalences in different parts of the country. Again, although we recognise with the author the impossibility of quoting in such a work as the present the authority for every statement, yet we think that a well selected series of references to those original memoirs, in which fuller details concerning each formation may be found, would greatly add to the value of the book without materially increasing its bulk.

We cannot but commend the manner in which Mr. Woodward has resisted all attempts at fine writing, and has sought rather to produce a work characterised by accuracy and soundness than by showiness and superficiality; in this respect following the example of his father, the late Dr. Samuel Woodward, to whose memory the work is dedicated. We anticipate for the "Geology of England and Wales" a sphere of usefulness not less extended than, and a reputation as enduring as that which has been attained by, the "Manual of the Mollusca;" and higher praise it would scarcely be possible to award to it.

It only remains to add that the work is illustrated, not only with a very clear chromo-lithographed map prepared by Mr. Griesbach, but by woodcuts of such excellence (as will be manifest from the specimens we give of them) that we can only regret that they are so few in number.

J. W. J.

#### SUMNER'S "METHOD AT SEA"

IN reference to our review of Sir William Thomson's work on this subject (vol. xiv. p. 346), our attention has been called by Sir G. B. Airy to the following paper in the *Proceedings of the Royal Society*, vol. xix. p. 448:—

"Remarks on the Determination of a Ship's Place at Sea." In a Letter to Prof. Stokes. By G. B. Airy, LL.D., &c., Astronomer-Royal.

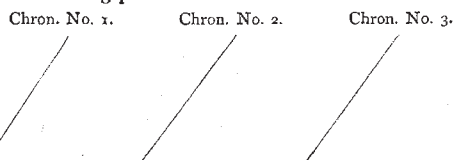
Royal Observatory, Greenwich, S.E.,  
1871, April 5.

MY DEAR SIR,—In the last published number of the *Proceedings of the Royal Society* (vol. xix. p. 259), there are remarks by Sir William Thomson on the proposed method for determining the *locus* of a ship's place at sea, by making one observation of the sun's (or other body's) altitude, and founding, on this, computations of longitude with two assumptions of latitude; and there are suggestions, with a specimen of tables, for solving the spherical triangles which occur in all similar nautical observations, on the principle of drawing a perpendicular arc of great circle from one angle of a spherical triangle upon the opposite side.

In regard to this principle and the tables which may be used with it, I may call attention to the employment of a similar method by Major-General Shortrede, in his "Latitude and Declination Tables," pp. 148 and 180. In p. 150, line 11 from the bottom, it will be seen that the "column" gives the trial-value of the perpendicular arc by which the two right-angled triangles are computed. This is not the same (among the various elements which may be chosen) as Sir William Thomson's; but it is so closely related that in some instances the tabular numbers are identically the same as Sir W. Thomson's, though in a different order. General Shortrede's object was "Great Circle Sailing," in which the trigonometrical problem is the same as in the nautical observation. I think, however, that Sir W. Thomson deserves thanks for calling attention to the application of this method to time-determinations.

In regard to the problem of the "*locus*," allow me to point out the geometrical circumstances of the case. If, upon a celestial globe, an arc of small circle be swept with the sun's (or other body's) place for centre, and the observed zenith-distance for radius, the ship's zenith will be somewhere in that curve; and if, with the pole for centre, arcs of parallels be swept with the two assumed colatitudes for radii, the intersection of these two curves with the first drawn curve will give the ship's zenith on the two assumptions; and if within the celestial globe there be placed a small terrestrial globe, and if these zenith-points be radially projected upon the terrestrial globe, the terrestrial places

of the ship on the two assumptions will be marked. But the practical application of this requires that the position of the terrestrial globe, or of the earth, be known in respect of rotation—that is, it requires that the Greenwich sidereal time, or solar time, be known; in other words, it requires a perfect chronometer. Now the experience of Capt. Moriarty, cited by Sir W. Thomson, does not apply here. Capt. Moriarty received time-signals from the Royal Observatory through the cable every day, and he had therefore a perfect chronometer. But other ships have no such perfect chronometer; and though the *direction* of a *locus*, as determined above, may be sufficiently certain, yet its *place upon the earth* will be uncertain, by a quantity depending on the uncertainty of the chronometer. Thus three chronometers may give the following positions for the *locus-curve*:—



And the question now presents itself, which uncertainty is the greater—the uncertainty of latitude, which it is the real object of this problem to remedy? or the uncertainty of the chronometric longitude, which must be used in attempting to find the remedy? I do not doubt the instant reply of any practical navigator, that the chronometric longitude is far more uncertain than the latitude; and if it be so, the whole method falls to the ground.

I fear that a publication like that which has been given to this method may do very great injury among navigators who are not accustomed to investigate the geometrical bearings of such operations, and may lead them into serious danger.

I am, my dear Sir, yours very truly,

G. B. AIRY.

Prof. Stokes, Secretary of the Royal Society.

[From a general recollection of a conversation I had with Sir W. Thomson before the presentation of his paper, I do not imagine his object to have been exactly what the Astronomer-Royal here describes, but partly the saving of trouble in numerical calculation, partly the exhibition, for each separate observation of altitude at a noted chronometer time, of *precisely what that observation gives, neither more nor less*, which introduces at the same time certain facilities for the determination of a ship's place by a combination of two observations. Of course the place so determined is liable to an error east or west corresponding to the unknown error of the chronometer; and doubtless, under ordinary circumstances, this forms the principal error to which the determination of a ship's place is liable. This remains precisely as it did before; and it is hard to suppose that the mere substitution of a graphical for a purely numerical process could lead a navigator to forget that he is dependent upon his chronometer, though perhaps the general tone of Sir W. Thomson's paper might render an explicit warning desirable, such as that which Mr. Airy supplies.—G. G. STOKES.]

#### NOTES

WE hear with sincere regret of the death of the eminent French meteorologist, M. Charles Sainte-Claire Deville. We hope next week to give some details of his life and work.

WE publish on another page an abstract of the Rev. Mark Pattison's forcible and outspoken address at the Social Science Congress, Liverpool, on the state of our universities. Many other valuable papers were read, but they were for the most part too special for notice in our columns. We should, however, mention the remarks of Mr. W. H. James, M.P., in connection with the discussion of the question of incorporating a professional and technical training with a sound system of general education. Mr. James traced the history of the City Guilds of London, showed how enormously wealthy they must be, how this wealth is totally misspent, and maintained that the country had a perfect right to ask an account of their stewardship, and appropriate the funds, if necessary, for educational purposes. He proposed that

the funds should be devoted to the establishment of a science and practice institute for working men. All the speakers in the Education department of the Congress seem to be agreed that there is vast room and urgent need for improvement in the education of the country. When so many intelligent and influential men are agreed on this point, how is it so little is done to mend matters? After the reading of a paper on Tuesday by Mr. W. J. Watts on the proposed Imperial Museum for India and the Colonies, a proposal was unanimously adopted by the Section of Economy and Trade, "that the Section recommend the Council to consider the propriety of memorialising her Majesty's Government in favour of establishing an Imperial Museum for India and the Colonies in London, and, if possible, with special arrangements for loan collections." In connection with the meeting of the Social Science Congress, at Liverpool, the *Liverpool Albion* has published a series of articles on the progress, present condition, and the great men born in that town. These have now been reprinted in a neat little pamphlet.

SOME account of Mr. Giles's trans-Australian journey has reached this country; he arrived in South Australia in August. Mr. Giles, who started on April 10 from a spot  $27^{\circ} 7'$  South latitude and  $116^{\circ} 45'$  East longitude, says:—"I made a generally north-east by east course by way of Mount Gould, in latitude  $26^{\circ} 46'$ , till the 24th parallel was reached. I traced the Ashburton to its sources, and determined the old watershed by the western rivers, which is simply a mass of rangy country abutting upon the desert in longitude  $120^{\circ} 20'$ . From the depot on the Ashburton I went up to the 23rd parallel. No watercourses flowed eastward. From the end of the watershed in that longitude, the latitude being near the 24th parallel, to the Rawlinson Range of my last horse expedition, in longitude  $127^{\circ}$ , the country was all open spinifex sandhill desert. At starting into the desert most of the camels were continually poisoned, the plant which poisoned them not being allied in any way to the poison plants of the settled districts of Western Australia. I now know it well, and have brought specimens. The longest stretch without water was a ten days' march. One old cow camel died after reaching the water. We had some rain on May 8 before reaching the Ashburton, and some of it must have extended into the desert. It was the only chance water we obtained. We had some more rain north of the Alfred and Mary ranges. Portions of the Rawlinson and Petermann ranges had been visited by rains, but the further we went eastward the more desolated with drought the country became. We struck the telegraph line at the angle poles close to Mount Halloran, on the Neal's River, sixty miles from the Peake, and travelled thence down the line to the station. We were all attacked with ophthalmia before the rains fell in May. The winter was excessively cold, the thermometer in the morning for weeks being down to  $18^{\circ}$ . No natives were met with from Mount Gould to the Petermann Ranges, at which last-named place they were friendly. In Musgrove Range they stole a few things, but I was absent at the time. The camels have travelled splendidly."

A MUSHROOM Exhibition will be opened on the 23rd inst. at the rooms of the French Botanical Society, 84 rue de Grenelle, Paris, which is likely to be of interest both from a scientific and an economical point of view. It is proposed to bring together all species of mushrooms, either in a fresh or a dry state, eatable, poisonous, hurtful to agriculture, as well as books, drawings, and engravings bearing on the subject. The exhibition will last eight days, during which there will be suitable lectures, as well as excursions to the neighbourhood of Paris. The following questions are proposed by the Society:—1. On the development of the reproductive organs of mushrooms; what is the exact signification of the terms *spores*, *chlamydospores*, *stylospores*, *conidia*, *spermata*, &c. 2. Fungoid protoplasm compared with

that of the vegetable chlorophylls. 3. On the classification of the *Agarici*, and generally the relative value of characteristics among mushrooms. 4. Study of the substrata necessary to the development of various fungoid species and of the relation which exists between the substrata and these species; questions relative to parasitism. 5. On edible mushrooms in various regions. 6. The necessity of encouraging chemical investigation on mushrooms; a *résumé* of the facts ascertained in this department to the present time. 7. The best processes for preserving mushrooms for study. 8. Bibliographical researches on the mycologists of last century.

A TASHKEND telegram of October 6 announces that the scientific staff of General Skobeleff's Alai Expedition have accomplished their work most successfully. The Alai and Trans-Alai mountains and the northern part of the Pamir plateau were surveyed along the routes followed, and astronomical determinations of latitude and longitude made. The highest spot, where astronomical observations were made, was at a height of 14,500 feet, and is in the part of Pamir called Khorgota. The height of the Oos-Bel pass was 15,500 feet. Measurements of the magnetic declination were also made on the Pamir plateau, and valuable collections brought home. The map of the Alai, plotted by Dr. Petermann on the basis of the surveys and descriptions of the late M. Fedchenko, proved to be very satisfactory.

THE congress of the International Geodesical Association, established by several European governments, was held this year at Brussels, and will be held in 1877 at Stuttgart. For a number of years the French Government abstained from sending delegates, but they were represented this year by M. Faye, M. Yvon Villarceau, and Major Perrier, director of the French Survey. The president was General Ibanez, the Spanish delegate. Switzerland was represented by M. Hirsh, Prussia by General von Baeyer, Austria by Oppolzer, Belgium by Major Adan, Saxony by M. Bruhm, Russia by General de Forsh. Neither England nor the United States sent any delegates. A report was presented by Major Adan on the registering meteorological instruments established at Ostend by Prof. Rysseberghe, of the Ostend Navigation School. These instruments, which obtained an exceptional reward at the International Geographical Exhibition at Paris in 1874, were praised in very warm terms. It is said that they will be used at a number of maritime stations for registering the tides. On the proposition of General Ibanez a requisition is to be sent to the French Government asking them to take the necessary steps for joining the French and the Spanish triangulations.

WE are glad to be able to state, at the request of the Hon. W. B. D. Mantell, of the New Zealand Legislative Council that he has publicly repudiated the contemptuous words in reference to scientific men attributed to him in *NATURE*, vol. xiv. p. 90. Such a statement, he says, would be an act of "gross and insane ingratitude" towards many men whom he is proud to call his friends. He was speaking only of "the shams and Dousterswivels of science," for nobody could have a greater or more devoted esteem for scientific men than he had. He was perfectly serious in proposing that an inquiry should be made in reference to the discovery of the skeleton referred to.

DR. MCKENDRICK has been appointed to the Chair of Physiology in the University of Glasgow.

THE Fellows of the College of Physicians of Dublin have deliberately determined to admit Miss Edith Pechey to the examination for the L.K.Q.C.P.I., and have thus thrown open the portals of the medical profession to all comers, whether they be "persons" of the male or female sex. However pregnant of results this decision may be, says the *Medical Press and Circular*, it does not



seem to us that any other conclusion was possible, and we expect to see a similar ingress allowed to the ladies by all other bodies. The Queen's University, it is anticipated, will be the next to follow suit, and these fortresses having surrendered at discretion, it is impossible that others can long sustain the siege.

A REPORT that Mr. Lucas, the African traveller, had given up exploration in consequence of illness is unfounded. Mr. Lucas had an attack of fever, but is now at Cairo waiting for stores which have been ordered from England, on the arrival of which he will proceed by steamer to Zanzibar, and again make for the interior. Mr. Lucas is in communication with the Royal Geographical Society.

MRS. NASSAU SENIOR writes to the *Times* on the curious behaviour of tempered glass. She furnished twelve gas burners with tempered glass globes purchased in London, and having the veritable label of M. de la Bastie affixed to each. On the night of the 6th inst. after the gas had been extinguished for exactly an hour, one of the globes burst with a report and fell in pieces on the floor, leaving the bottom ring still on the burner. These pieces, which were, of course, found to be perfectly cold, were some two or three inches long, and an inch or so wide. They continued for an hour or more splitting up and subdividing themselves into smaller and still smaller fragments, each split being accompanied by a slight report, until at length there was not a fragment larger than a hazel nut, and the greater part of the glass was in pieces of about the size of a pea, and of a crystalline form. In the morning it was found that the rim had fallen from the burner to the floor in atoms. The subject deserves careful investigation.

THE Science Loan Exhibition has been so successful that the time for closing it has been postponed, and the evening lectures are to be recommenced immediately.

WE have received *Études sur les Mouvements de l'Atmosphère*, Part I, by Professors C. M. Guldberg and H. Mohn, of Christiania. In this first part of what promises to be an important contribution to the physics of the atmosphere, the authors confine the discussion to some simple elementary cases of the mechanics of the atmosphere relative to its equilibrium, temperature, humidity, and horizontal and vertical currents. We join the authors in hoping that the results will demonstrate the necessity of more extensive observations than have yet been made in tropical regions, and in the higher regions of the atmosphere on mountains or by captive balloons, and that the true path of progress for meteorology to follow is the development of the difficult question of atmospheric mechanics. We may add that in order to obtain the physical data required for its discussion, the only rational step to be first taken is to plant numerous meteorological stations over limited areas, the stations being so closely planted as to secure approximations to the barometric gradients between the observing-stations and to the wind-velocities, sufficiently close to the true gradients and velocities as to meet the demands of the problem to be investigated.

THE teaching body of the French National School of Agriculture, established at the Conservatoire des Arts-et-Métiers, has now been organised. The director of studies is M. Boussingault, the founder of agricultural chemistry in France. The number of professorships is twenty, and a competition will take place for three of them. Amongst the seventeen others who have been appointed by decree, M. Lavergne, Professor of Agricultural Economy, M. Leon Bocquerelle, Professor of Physics and Meteorology, and M. Tany, Professor of Sylviculture, were formerly professors at the Versailles School of National Agriculture, which was suppressed in 1852. The former imperial farmhouse at Vincennes will be utilised for experimental agriculture. Amongst the professorships which have been created ought to be

noticed one of Comparative Agriculture, or the systematic comparison of French and foreign agriculture.

M. WADDINGTON, the French Minister of Public Instruction, has published a circular warning the several municipal administrations of France, that he is to ask from Parliament next session a credit for increasing the salaries of professors who, having not taken any superior degree, are nevertheless useful and steady workers. But he desires the cities to enter into an agreement with the Government to secure to competent teachers in the several municipal secondary schools a rate of remuneration not below a sum named. It is only when that rate shall have been granted as a permanency by the local authorities that the Government will give any addition.

M. WADDINGTON is said to be preparing to present to both Houses of the French Parliament a Bill to alter the law for granting degrees, giving the power entirely to the State examiners. The same proposal was rejected by the Senate last spring.

A NEW municipal school, the *École Monge*, was opened at Paris on October 8. The peculiarity of the establishment is a covered yard situated in the centre of the building, and occupying a space of 18,000 square feet for winter recreations. When the weather is favourable, the pupils are turned into an open ground of 27,000 square feet. A portico for gymnastics has been erected in the winter grounds. To each studio is annexed a small museum, so that pupils may have constantly at their disposal the principal objects or models which are described in the course of the lectures given by the teachers. The school is intended for 800 pupils, but only 500 have been admitted, a part of the work being yet unfinished.

THE *Tarbes Observateur* states that a strong earthquake was felt at Bagnères de Bizarre (Hautes Pyrenees) on Friday, October 6, at five in the morning. The water of Salies, a thermal spring in the vicinity, which generally flows at 59° F., had its temperature suddenly altered to 72°, owing to the subterranean action. A few hours afterwards the same commotion was felt by General Nansouty, who has taken his post as observer on the Pic du Midi. The duration was three seconds, and direction south by north.

ON September 22, an earthquake motion was felt at Corleone, near Palermo, and from that time to September 27, seismic commotions were almost continuous. Great damage has been done to a large number of houses, and the inhabitants desert the city every night and encamp in the vicinity; cold is becoming intense during the now long nights. Some are said to have turned insane.

MESSRS. C. G. MAYNARD, of Newtonville, Massachusetts, and W. F. Parker, of West Meriden, Connecticut, are about to undertake an investigation of the natural history of the Bahama Islands, which promises to be of great interest to science in view of the fact that, with the exception of the examination made by Dr. Henry Bryant, of Boston, U.S., but little has been done in this respect since the time of Catesby, whose work was published nearly 150 years ago. These gentlemen propose to fit out a yacht in Boston, suitably equipped and provisioned, and send her to the Gulf of Mexico, there to embark some time in the present month, and to make a minute investigation of the natural history of each island, obtaining specimens of its land fauna and of the inhabitants of the waters along their shores. They will be accompanied by several assistants, and hope to make very large collections of all kinds. Dr. Lewis E. Sturtevant, of Boston, will accompany the expedition for the purpose especially of assisting Mr. Maynard in making drawings and dissections on the spot of the various animals.

A NAVAL testimonial will be presented to Commander V. L. Cameron, R.N., C.B., at the Royal United Service Institution,

on Saturday, at 3 o'clock. Admiral Sir G. P. Sartorius will preside.

PROF. W. K. PARKER, F.R.S., and Mr. G. T. Bettany, B.A., of Caius College, Cambridge, are preparing a work on the Morphology of the Skull, in which for the first time will be brought together for comparison descriptions of the remarkable succession of modification through which the skull passes in development in the principal types of vertebrated animals; the forms illustrated will be the sharks and rays, the salmon, the axolotl, the frog, the snake, the fowl, and the pig. A special value will attach to the work inasmuch as it will record many corrections of facts and important modifications of view since the publication of Prof. Parker's elaborate papers in the *Transactions* of various societies, and will also include many observations yet unpublished. A simple description of each form at successive stages will be followed by a chapter dealing with theoretical questions, and summarising the results of study. The work will be illustrated by a large number of woodcuts, and will be published by Messrs. Macmillan.

THE scintillation of stars, and its close connection with changes of weather, has, as is known, much interested Humboldt, Arago, Kaemtz, Secchi, and many others; and recently it has also been the subject of valuable spectroscopic researches by M. Respighi. M. Montigny, who some time ago investigated scintillation in relation to the special characteristics of the light of different stars, publishes in the *Bulletin* of the Belgian Academy, 1876, No. 8, an elaborate report upon his researches into the connection existing between scintillation and various meteorological elements. The chief results arrived at after a discussion of 1,820 observations made on 230 days on 70 different stars, are as follow:—The intensity of scintillation (measured by a special apparatus, the scintillomètre) increases invariably with the occurrence or approach of rainy weather, and with the increase of tension of vapour in the air on one side, and the increase of pressure and decrease of temperature on the other; the influence of the two former factors being far more sensible than the combined influence of the two latter. The scintillation, which is on an average stronger during winter than during summer, increases with the arrival of moist weather at all seasons. It increases also not only on rainy days, but one or two days before, decreasing immediately after the rain has ceased. Moreover, the intensity of scintillation increases during strong winds, and with the approach of barometric depressions, or *bourrasques*, the increase being most pronounced when the depression passes near to the observer. It then largely exceeds the average increase corresponding to rainy days, and the influence of great movements in the atmosphere totally counteracts the contrary influence of a lowering of pressure. M. Montigny is thus correct in saying that a continued investigation of scintillation would be of great service, not only for the prevision of weather, but also for the general study of meteorology, affording a very useful means for the exploration of the higher regions of the atmosphere.

THE additions to the Zoological Society's Gardens during the past week include a Chacma Baboon (*Cynocephalus porcellus*) from South Africa, presented by Mr. Henry S. Wright; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. H. Jones; a Little Grebe (*Podiceps minor*), European, presented by Mrs. Johnson; two Snowy Owls (*Nyctea nivea*), European, presented by Mr. L. W. Gardiner; nine Red-bellied Newts (*Triton alpestris*) from Tyrol, presented by Mr. P. L. Sclater, F.R.S.; a Tamandua Ant-eater (*Tamandua tetradactyla*) from South America, purchased; an Ocelot (*Felis pardalis*) from America, two Indian Cobras (*Naja tripudians*) from India, deposited; a Geoffroy's Dove (*Peristera geoffroyi*) bred in the Gardens.

## SCIENTIFIC SERIALS

*Journal of the Chemical Society*, July, 1876.—Mr. Thomas Carnelley, B.Sc., communicates the results of investigations recently made by him, on the action of water and of various saline solutions on copper. Mr. Carnelley has found that distilled water dissolves an appreciable amount of copper, on standing in contact with the metal even for the comparatively short space of an hour.—Mr. M. M. Pattison Muir, F.R.S.E., gives the second part of a paper on certain bismuth compounds. There are also two communications from Dr. Thudicum's Physiological Laboratory. The first is by Dr. Thudicum and C. T. Kingzett, on glycerophosphoric acid and its salts, as obtained from the phosphorised constituents of the brain. The second is by Dr. Thudicum, on some reactions of biliverdin. There are besides a note on the occurrence of benzene in rosin light oils, by Mr. Watson Smith, F.C.S., and a second paper by the same gentleman on a new method of preparing diphenyl and isodiphenyl, and on the action at a high temperature, of metallic chlorides on certain hydrocarbons.

*Gazzetta Chimica Italiana*, Fasc. v. and vi.—The following papers comprise the contents of this number:—The inactive amylic alcohol of fermentation, by L. Balbiano.—An alkaloid which they found in spoiled Indian corn and in stale maize bread, by T. Brugnatelli and E. Zenoni. The authors consider this alkaloid to be the cause of "pellagra," a disease which commits great ravages in Lombardy.—Concerning a series of compounds derived from ammonaldehyde, by R. Schiff.—On gelatine, considered especially as regards its reducing agency, by G. Bizio.—On the emission of nascent hydrogen from vegetables, by G. Pollacci.—G. Scurati Manzoni contributes two papers; the first, on the action of certain reagents upon the principal organic colouring matters, is accompanied with extensive tables, which contain much valuable information; the second treats of the employment of sodic hydrosulphite as a reagent in the analysis of the colours fixed upon tissues.—On the natural poison of the human body, by A. Moriggia.—Concerning the methods of preparing the iodides of potassium and sodium, and of potassic bromide, by P. Chiappe and O. Malesci.—Observations on a process for obtaining iodic acid, by causing chlorine to act upon iodine suspended in water, by G. Sodini.—On the precipitate of sulphur, by M. Sansoni and G. Cappellini.—A method for detecting the adulteration of plumbic iodide, by L. Alessandri and C. Conti.—A new reagent for the investigation and estimation of glucose, by A. Soldaini.

*Memoria della Società degli Spettroscopisti Italiani*, May, 1876.—Prof. Tacchini gives the statistics of solar eruptions observed at Palermo in 1872. In 134 days of observation fifty-two eruptions were seen—twenty-four on the eastern limb and twenty-eight on the western, and none apparently occur within 40° of either pole. There also appears a detailed statement by Prof. Tacchini of the positions on which magnesium was seen on the limb during the months of August, September, and October, 1875.—Observations of the partial eclipse of the sun on September 29, 1875, made at Padua by Dr. Abetti.—Spots and faculae on the sun's limb, observed at Palermo; the lines seen bright in the spectrum of the jets are  $\delta^1$   $\delta^2$   $\delta^3$   $\delta^4$ , 1474, 4923, 5017, and sodium lines. A sheet showing the chromosphere on each day in August, 1874, accompanies this number.

June, 1876.—Observations of spots and faculae made at Palermo in May, 1876, with a table showing the numbers of positions at which the  $\delta$  and 1874 line were visible at the limb.—Observations of solar protuberances from June 29 to December 11, 1875, showing the number in each 10° of the sun's circumference, their heights, and area.—A note by Father Secchi on the change of position of the lines in the spectra of stars caused by their movement in space. In his experiments the author placed the vacuum tube for comparison in front of the object-glass, and he and his assistants found the stellar and tube lines could be made to change places by the motion of the telescope, and that the results by this method are not trustworthy. The author then gives a list of stars with their motions as given by Huggins, Greenwich, Secchi, and Vogel, showing a great discrepancy between the observers.—On the observation of the zodiacal light, made by Rev. Geo. Jones, from April, 1853 to April, 1855, by A. Serpieri. About thirty-nine observations with the lat. and long. of the place of the observer appear, together with other tables of the positions of the light, and a lengthy paper of remarks on the same. Drawings of the chromosphere for September, October, and November, 1874, accompany the number.